OM-1036 169 964A
September 1999

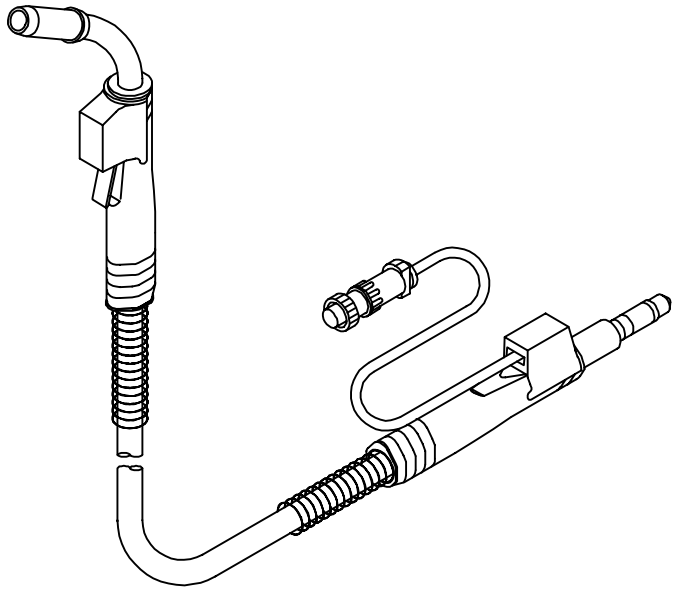
Processes

MIG (GMAW) Welding
Flux Cored (FCAW) Welding

Description

Air-Cooled Gun

M-40



OWNER'S MANUAL

Visit our website at
www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite. We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

ISO 9001 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**

TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

Miller® *The Power of Blue.*

SAFETY PRECAUTIONS FOR GMAW GUNS

⚠ WARNING

GMAW WELDING can be hazardous.

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR.

In welding, as in most jobs, exposure to certain hazards occurs. Welding is safe when precautions are taken. The safety information given below is only a summary of the more complete safety information found in the wire feeder and welding power source Owner's Manuals. Read and follow all safety precautions.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.

ELECTRIC SHOCK can kill.

1. Always wear dry insulating gloves.
2. Insulate yourself from work and ground.
3. Do not touch live electrode or electrical parts.
4. Repair or replace worn, damaged, or cracked gun or cable insulation.
5. Turn off welding power source before changing contact tip or gun parts.
6. Keep all covers and handle securely in place.

FUMES AND GASES can be hazardous to your health.

1. Keep your head out of the fumes.
2. Ventilate area, or use breathing device.
3. Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used.

WELDING can cause fire or explosion.

1. Do not weld near flammable material.
2. Do not weld on closed containers.
3. Watch for fire; keep extinguisher nearby.

ARC RAYS can burn eyes and skin.

1. Wear welding helmet with correct shade of filter.
2. Wear correct eye and body protection.
3. Cover exposed skin with spatter-resistant clothing.

HOT SURFACES can burn skin.

1. Allow gun to cool before touching.
2. Do not touch hot metal.
3. Protect hot metal from contact by others.

NOISE can damage hearing; SOME APPLICATIONS, SUCH AS PULSING, are noisy.

1. Check for noise level limits exceeding those specified by OSHA.
2. Use approved ear plugs or ear muffs if noise level is high.
3. Warn others nearby about noise hazard.

WELDING WIRE can cause puncture wounds.

1. Keep hands and body away from gun tip when trigger is pressed.

EMF INFORMATION

NOTE ☞

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): ". . . there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around the body.
4. Keep welding power source and cables as far away as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

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SECTION 1 – SAFETY INFORMATION

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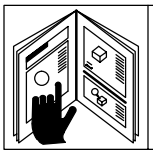
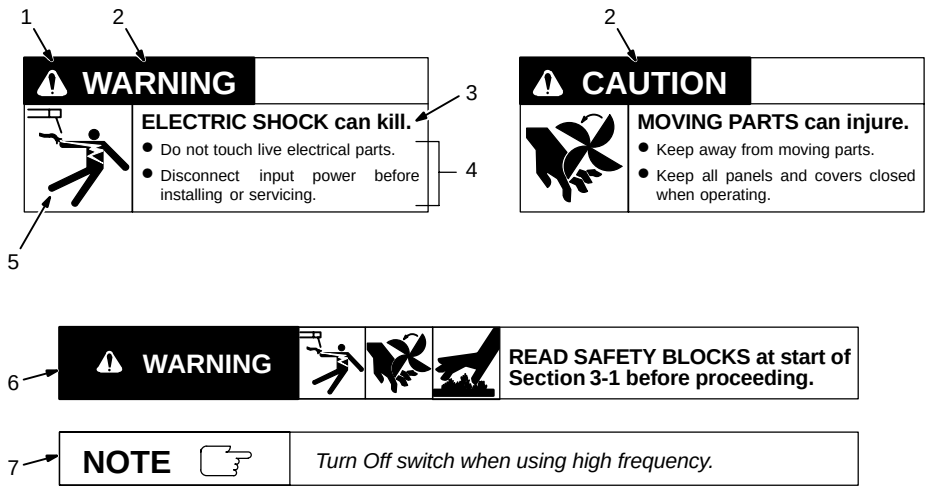


- Read all safety messages throughout this manual.
- Obey all safety messages to avoid injury.
- Learn the meaning of WARNING and CAUTION.



1 Safety Alert Symbol

2 Signal Word

WARNING means possible death or serious injury can happen.

CAUTION means possible minor injury or equipment damage can happen.

3 Statement Of Hazard And Result

4 Safety Instructions To Avoid Hazard

5 Hazard Symbol (If Available)

6 Safety Banner

Read safety blocks for each symbol shown.

7 NOTE

Special instructions for best operation – not related to safety.

Figure 1-1. Safety Information

SECTION 2 – SPECIFICATIONS

Table 2-1. Welding Gun

Specifications	Description
Rated Output	M-40: 400 Amperes Using CO_2 Shielding Gas
Cooling Method	Air Cooled
Duty Cycle	See Section 2-1
Wire Diameter	*M-40: .035 To 5/64 in (0.9 To 2.0 mm) Hard Or Flux Cored Wires
Weight	10 ft Gun – Net: 7.6 lb (3.5 kg); Ship: 9.1 lb (4.1 kg) 12 ft Gun – Net: 8.5 lb (3.9 kg); Ship: 10 lb (4.5 kg) 15 ft Gun – Net: 9.9 lb (4.5 kg); Ship: 11.4 lb (5.2 kg)

*With proper consumables, .047 (1.2 mm) aluminium wire can be used in M-40 models.

2-1. Duty Cycle

⚠ CAUTION

WELDING LONGER THAN RATED DUTY CYCLE can damage gun and void warranty.

- Do not weld at rated load longer than shown below.

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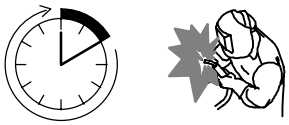
Definition

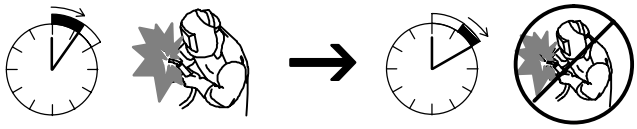
Duty Cycle is percentage of 10 minutes that gun can weld at rated load without overheating.

M-40: 100% Duty Cycle At 400 Amperes Using CO_2
M-40: 100% Duty Cycle At 275 Amperes Using Mixed Gases



Continuous Welding

M-40: 60% Duty Cycle At 525 Amperes Using CO_2
M-40: 60% Duty Cycle At 400 Amperes Using Mixed Gases



6 Minutes Welding — 4 Minutes Resting

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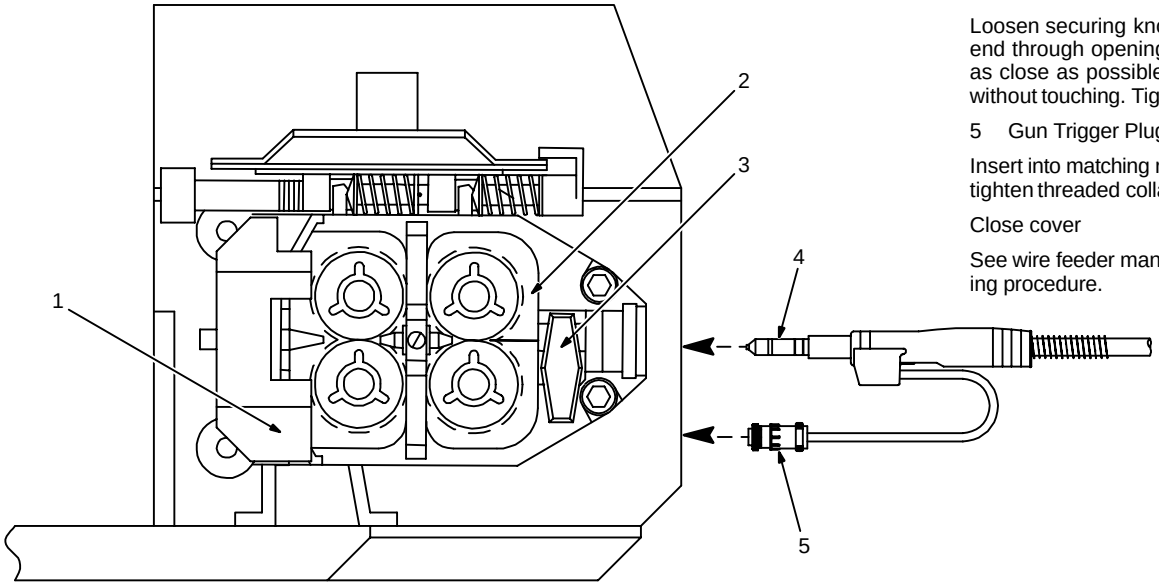
Figure 2-1. Duty Cycle

SECTION 3 – INSTALLATION

3-1. Preparing And Installing Gun



1 Drive Assembly Cover

2 Drive Assembly

3 Gun Securing Knob

4 Gun End

Loosen securing knob. Insert gun end through opening and position as close as possible to drive rolls without touching. Tighten knob.

5 Gun Trigger Plug

Insert into matching receptacle and tighten threaded collar.

Close cover

See wire feeder manual for threading procedure.

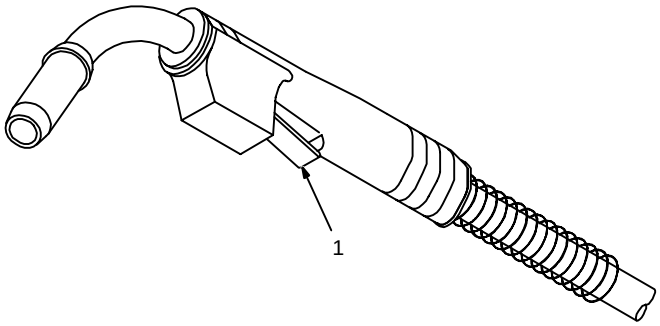
Ref. ST-152 466 / Ref. ST-800 749-A

Figure 3-1. Installing Gun

SECTION 4 – OPERATION

⚠ WARNING | **READ SAFETY BLOCKS at beginning of manual before proceeding.**

4-1. Operating The Gun



1 Trigger Switch

When pressed, energized wire feeds and shielding gas flows.

Ref. ST-800 749-A

Figure 4-1. Using Gun Switch

SECTION 5 – MAINTENANCE & TROUBLESHOOTING

⚠ WARNING | **READ SAFETY BLOCKS at beginning of manual before proceeding.**

5-1. Maintenance And Troubleshooting

⚠ Turn Off all power before maintaining.

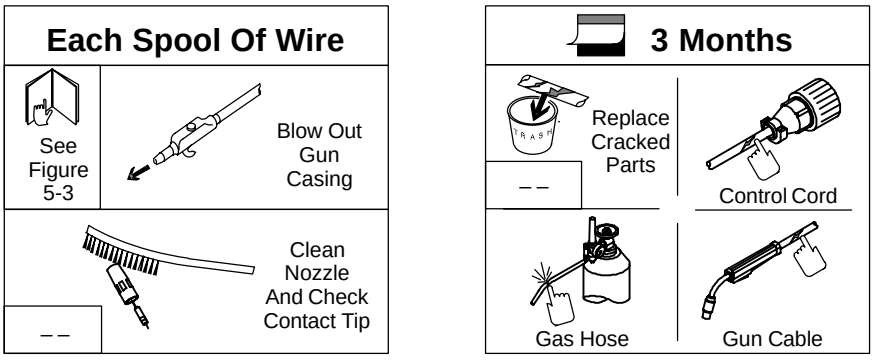


Figure 5-1. Routine Maintenance

Table 5-1. Troubleshooting

Trouble	Remedy	Section
Wire does not feed.	Check contact tip. Check for kinks in gun cable.	5-2
	Check gun trigger plug connection at welding power source/wire feeder.	3-1
	Check, and if necessary, replace gun trigger switch.	5-3
Wire is not energized.	Check contact tip.	5-2
	Check gun trigger plug connection at welding power source/wire feeder.	3-1
	Check, and if necessary, replace gun trigger switch.	5-3
Wire feeds unevenly.	Check contact tip. Check for kinks in gun cable. Blow out liner and gun casing.	5-2
Weld porosity.	Remove weld spatter buildup in nozzle.	– –
	Make sure inner support tube is tight in cable connector.	– –

5-2. Changing Contact Tip, Liner, And Head Tube

A. Changing Contact Tip

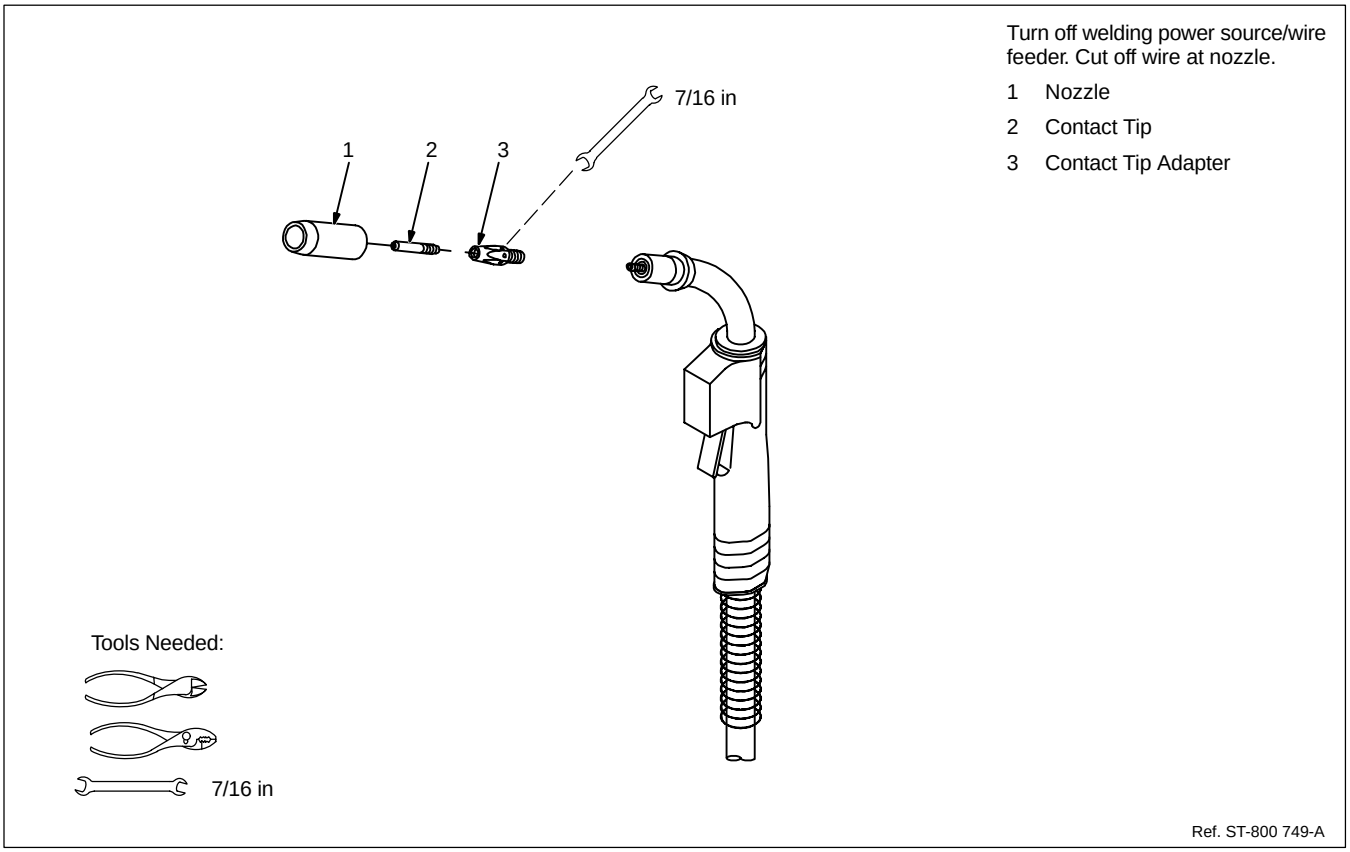


Figure 5-2. Changing Contact Tip

B. Changing Liner

⚠ CAUTION

FLYING METAL CHIPS AND DIRT can cause injury and damage equipment.

- Point gun away from people and in a safe direction when blowing out with compressed air.

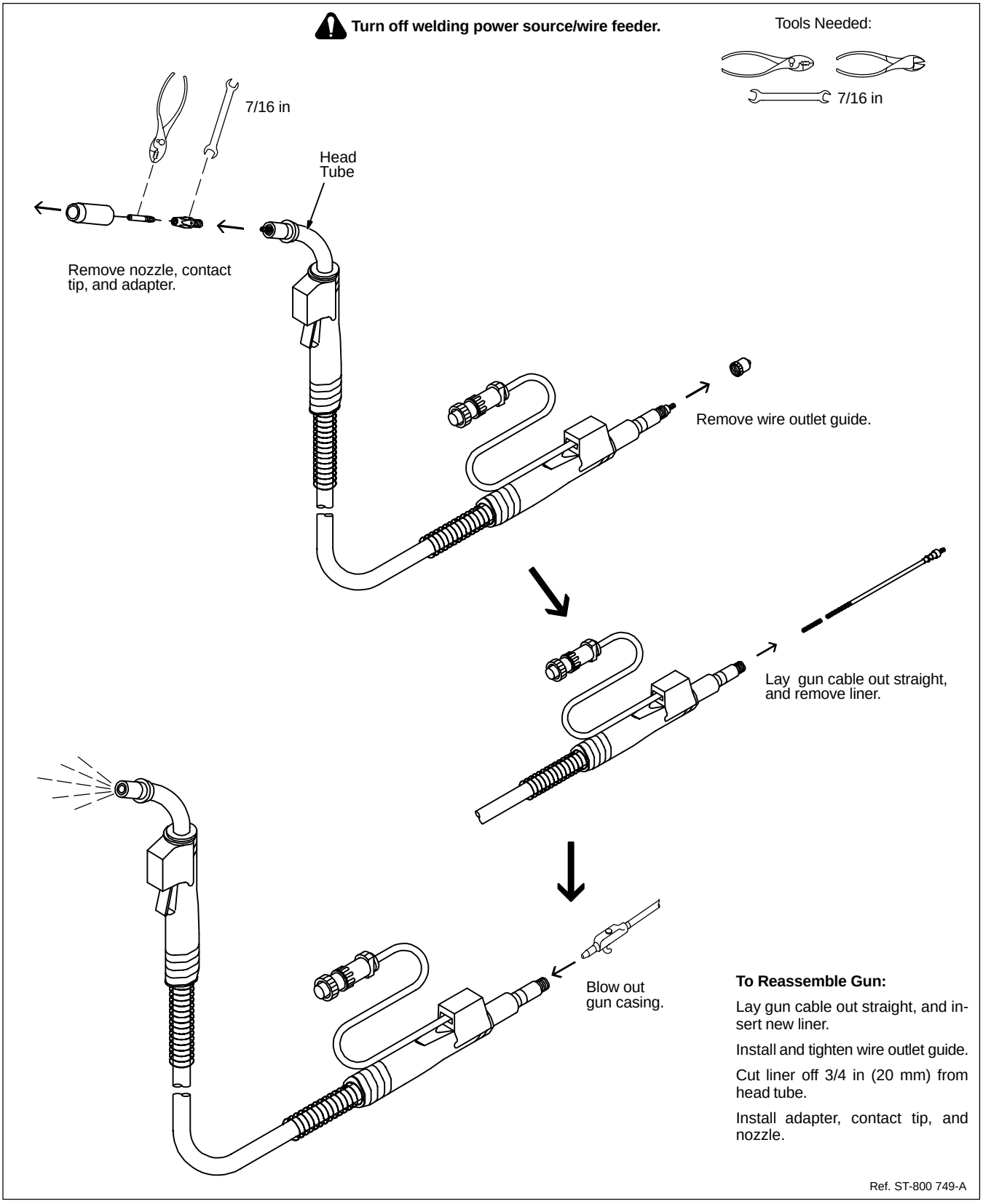

Turn off welding power source/wire feeder.
Tools Needed:
7/16 in
7/16 in
Head
Tube
Remove nozzle, contact tip, and adapter.
Remove wire outlet guide.
Lay gun cable out straight, and remove liner.
Blow out gun casing.
To Reassemble Gun:
Lay gun cable out straight, and insert new liner.
Install and tighten wire outlet guide.
Cut liner off 3/4 in (20 mm) from head tube.
Install adapter, contact tip, and nozzle.
Ref. ST-800 749-A

Figure 5-3. Changing Liner

C. Replacing Head Tube

Turn off welding power source/wire feeder.

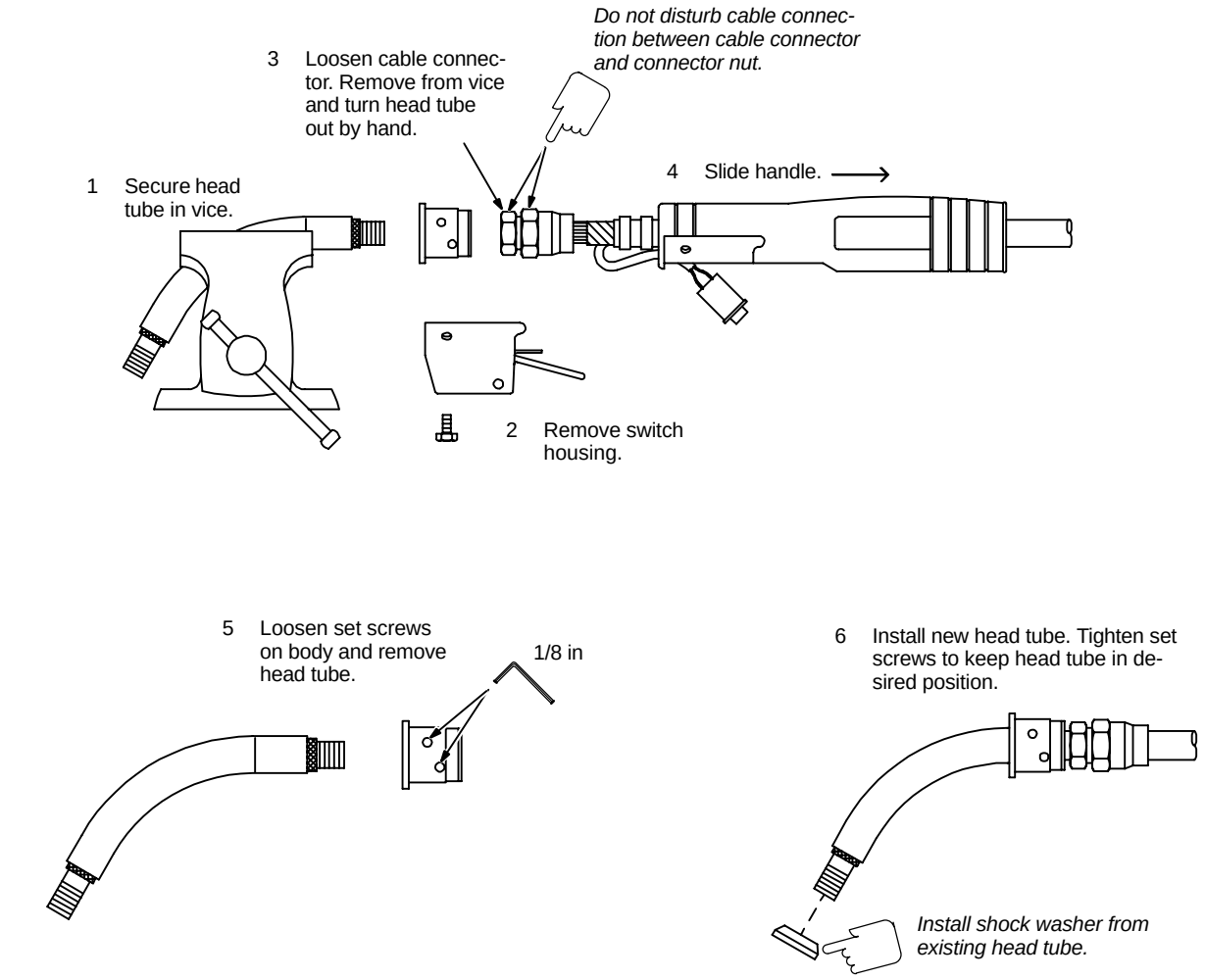
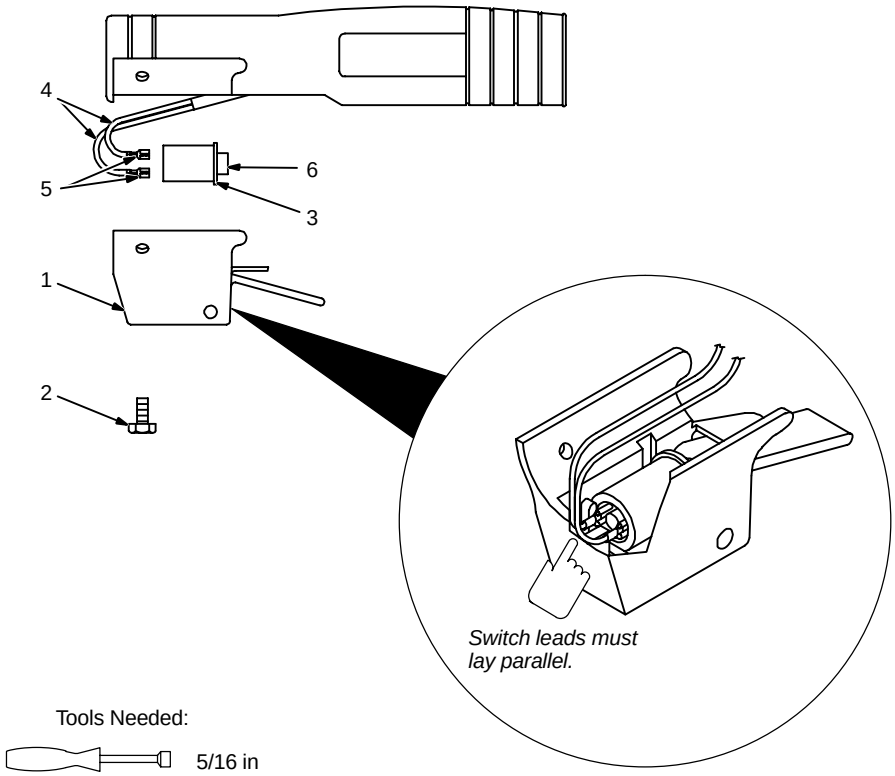

Do not disturb cable connection between cable connector and connector nut.
3 Loosen cable connector. Remove from vice and turn head tube out by hand.
4 Slide handle.
1 Secure head tube in vice.
2 Remove switch housing.
5 Loosen set screws on body and remove head tube.
1/8 in
6 Install new head tube. Tighten set screws to keep head tube in desired position.
Install shock washer from existing head tube.
7 Hand-tighten head tube into cable connector. Place head tube in vice and tighten to within 1/8 in (3 mm) spacing between cable connector and body.
8 Reposition handle and install switch housing (see Section 5-3).
Tools Needed:
5/16 in
7/8 in
1/8 in
ST-800 751-B

Figure 5-4. Replacing Head Tube

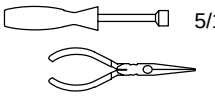
5-3. Switch Replacement

Turn off welding power source/wire feeder and, disconnect gun.

See Parts List for correct replacement parts.



Tools Needed:



1 Switch Housing

2 Screw

Remove both mounting screws from switch housing.

3 Switch

4 Switch Leads

Carefully pull up on leads to remove switch from housing.

5 Switch Lead Connectors

Remove switch lead connectors from switch terminals and discard old switch.

Push switch lead connectors onto terminals of new switch.

6 Switch Plunger

Insert switch back into switch housing until it snaps into place.

Install switch housing back onto handle.

ST-800 750

Figure 5-5. Switch Replacement

5-4. Unicable Repair

To repair or replace unicable, order Unicable Clamp Kit, part number 169 690. Kit includes all required instructions, clamps, inner support tube, compression clip, switch leads, and connectors.

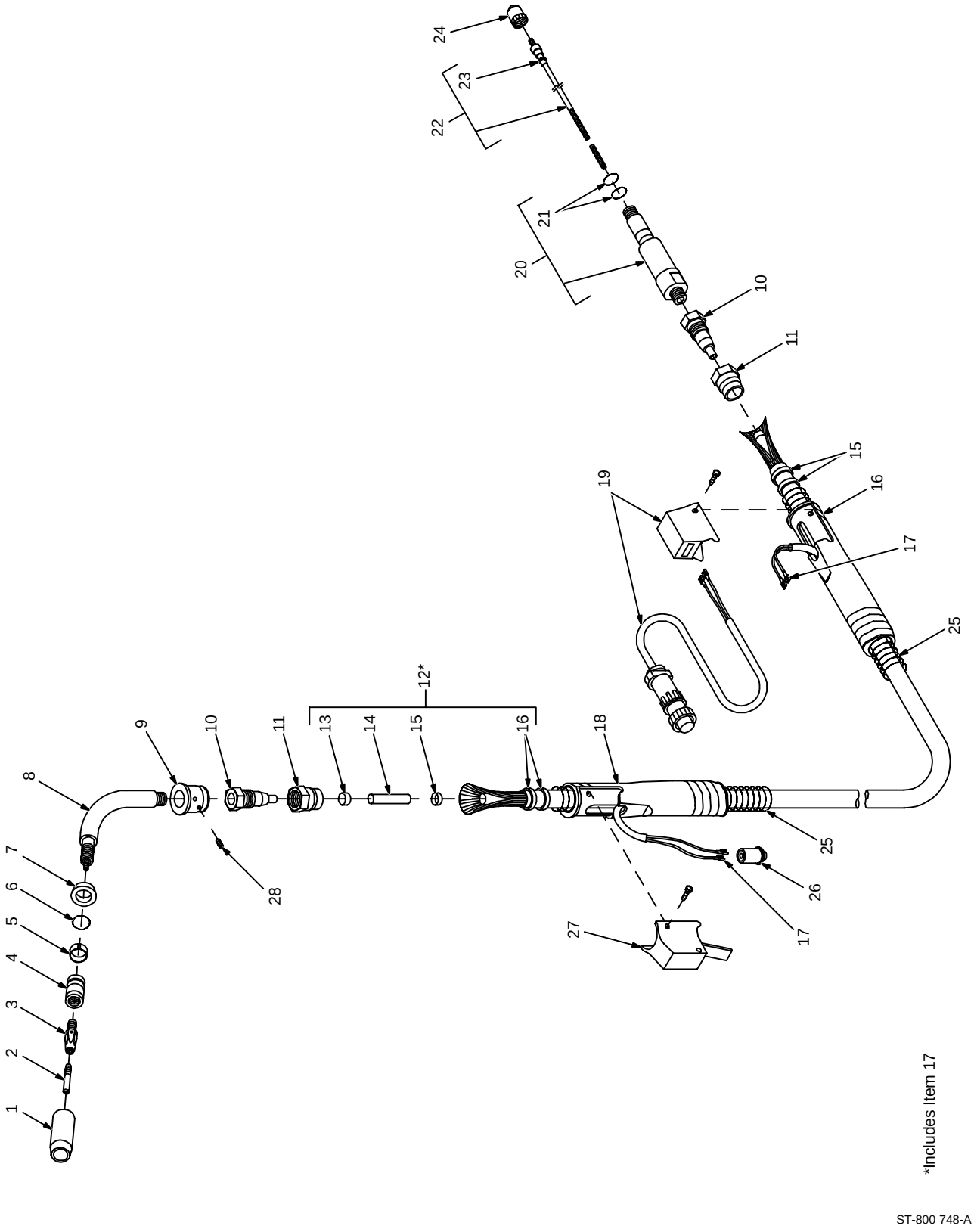


Figure 6-1. M-40 Gun

Item No.	Part No.	Description	Quantity

Figure 6-1. M-40 Gun

1	+169 724	NOZZLE, slip type .500 orf .125 recess	1
1	+169 726	NOZZLE, slip type .625 orf flush	1
1	+169 727	NOZZLE, slip type .625 orf .125 stickout	1
1	+169 725	NOZZLE, slip type .625 orf .125 recess	1
2	+000 068	TIP, contact scr .035 wire x 1.125	2
2	+000 069	TIP, contact scr .045 wire x 1.125	2
2	+172 024	TIP, contact scr 1/16 wire x 1.125	2
2	+172 025	TIP, contact scr 5/64 wire x 1.125	2
2	+172 034	TIP, contact scr 3/64 wire x 1.125	2
3	169 728	ADAPTER, contact tip	1
4	169 729	ADAPTER, nozzle	1
5	170 467	RING, retaining	1
6	170 468	O-RING	1
7	169 730	WASHER, shock	1
8	169 744	TUBE, head	1
9	170 453	BODY	1
10	170 452	CONNECTOR, cable	2
11	170 451	NUT, connector	2
12	169 690	M-40 UNICABLE CLAMP KIT, (consisting of)	2
13	170 461	CLIP, compression	1
14	170 459	TUBE, support	1
15	170 460	CLAMP, inner	1
16	170 457	CLAMP, jacket	2
17	169 746	CONNECTOR, switch lead	2
18	170 454	HANDLE	2
19	180 432	CORD, trigger assembly	1
20	169 745	CONNECTOR, feeder (consisting of)	1
21	079 974	O-RING, .500 ID x .103CS rbr	2
22	194 010	LINER, monocoil .023/.025 wire x 15ft (consisting of)	1
22	194 011	LINER, monocoil .030/.035 wire x 15ft (consisting of)	1
22	194 012	LINER, monocoil .035/.045 wire x 15ft (consisting of)	1
22	194 013	LINER, monocoil 1/16 – 5/64 wire x 15ft (consisting of)	1
22	194 014	LINER, monocoil 3/64 aluminum wire x 15ft (consisting of)	1
23	079 975	O-RING, .187 ID x .103CS rbr	1
24	169 723	GUIDE, outlet	1
25	170 458	STRAIN RELIEF, cable	2
26	170 455	SWITCH, trigger	1
27	170 456	HOUSING, switch w/screws	1
28	602 177	SCREW, set .250-20 x .250 knrlpt sch stl	2

BE SURE TO PROVIDE MODEL AND STYLE NUMBER WHEN ORDERING REPLACEMENT PARTS.

Notes

Warranty Questions?

Call
1-800-4-A-MILLER
for your local
Miller distributor.

Your distributor also gives you ...

Service
You always get the fast, reliable response you need. Most replacement parts can be in your hands in 24 hours.

Support
Need fast answers to the tough welding questions? Contact your distributor. The expertise of the distributor and Miller is there to help you, every step of the way.

Miller
The Power of Blue.

TRUE BLUE® WARRANTY

Effective January 1, 2000
(Equipment with a serial number preface of "LA" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate 185 & Spoolmate 250
   * Canvas Covers

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

Owner's Record

Please complete and retain with your personal records.

Model Name Serial/Style Number

Purchase Date (Date which equipment was delivered to original customer.)

Distributor

Address

City

State Zip

For Service

Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables
	Options and Accessories
	Personal Safety Equipment
	Service and Repair
	Replacement Parts
	Training (Schools, Videos, Books)
	Technical Manuals (Servicing Information and Parts)
	Circuit Diagrams
	Welding Process Handbooks
Contact the Delivering Carrier for:	File a claim for loss or damage during shipment.
For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.	

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